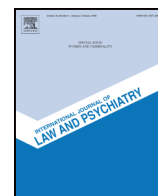




Contents lists available at ScienceDirect

International Journal of Law and Psychiatry



Attorney beliefs concerning scientific evidence and expert witness credibility

Hayley J. Wechsler^{a,*}, Andre Kehn^b, Richard A. Wise^b, Robert J. Cramer^a^a Sam Houston State University, Huntsville, TX, USA^b University of North Dakota, Grand Forks, ND, USA

ARTICLE INFO

Available online xxx

Keywords:
Expert witness credibility
Forensic science
Social science
Attorneys
Vetting experts

ABSTRACT

Expert witnesses play a pivotal role in offering a variety of scientific evidence at trial. Although judges are the ultimate gatekeepers of what constitutes valid scientific evidence, attorneys play an important part in determining what evidence is presented to the court. Employing experimental and descriptive analyses, the present study sought to address gaps in the attorney/expert witness literature by addressing three questions: One) To what extent do attorneys prefer forensic or social scientific evidence and experts?, Two) How knowledgeable are attorneys concerning empirically-supported indicators of expert credibility?, Three) What do attorneys believe concerning the frequency and nature of expert errors in their own trials relative to others? Results showed that attorneys prefer forensic science evidence and experts compared to social/psychological counterparts. Moreover, attorneys displayed considerable knowledge of factors that will impact perceived expert credibility. In particular, attorneys value perceived expert trustworthiness, communication skills, content of testimony/reports, perceived expert knowledge, and years and type of expert experience. Finally, attorneys displayed a consistent and strong self-serving bias pattern, such that they believe expert errors occur more much frequently in other attorneys' cases compared to their own. Implications are discussed with respect to vetting expert witnesses, scientific evidence/errors and wrongful conviction, and training for attorneys.

© 2015 Elsevier Ltd. All rights reserved.

Expert witnesses provide legally relevant knowledge to the court based on their area of expertise (Melton, Petrila, Poythress, & Slobogin, 2007), educating fact-finders on scientific or professional data, conclusions, and opinions (Brodsky, Griffin, & Cramer, 2010). Testifying roles of an expert include court appointed testimony, neutral evaluator, case-blind didactic fact expert, testifying, evaluating expert hired by either the defense or the prosecution, and work product reviewer (Gould, Martindale, Tippins, & Wittman, 2011). The U.S. Supreme Court has held that expert testimony, to be admissible in federal courts, must be relevant to the case and based on principles, theories, or techniques that are scientifically reliable and valid. In making this determination, courts should generally consider the following factors: (a) Whether the principles, theories, or techniques of the expert can be tested and has been tested? (b) Whether they have been subject to peer review? (c) What are their known or potential error rates? (d) Whether they have been generally accepted in the relevant scientific community? (*Daubert v. Merrell Dow Pharmaceuticals & Inc.*, 1993; *General Electric v. Joiner*, 1997; *Kumho Tire Co. & Ltd. v. Carmichael*, 1999). These determining factors of admissibility, commonly known as the *Daubert* standards, have been widely adopted by many states; however, there is no compulsion to do so, as *Daubert* was a case that merely interpreted the Federal Rules of Evidence.

Furthermore, it is important to note that in criminal cases, it has been found that in cases containing *Daubert* issues, the prosecutor's position (whether it is in support of questioned expertise or in opposition to it) is much more likely to be sustained than is that of the defense counsel's (Risinger, 2000). Also, due to many criminal defendants' lack of resources, scientific evidence is often used as a tool of the resource-laden prosecution rather than the defense (Rozelle, 2007). In reference to this potential prosecution bias, Rozelle (2007) proposes, "The game of scientific evidence looks fixed" (Rozelle, 2007, p. 598). Meanwhile, the same pattern is not seen in Risinger's (2000) examination of a large random sample of civil *Daubert* appeals. On the contrary, these cases, which were brought forth by the defendant ninety percent of the time, were most often sustained in favor of the defendant (Risinger, 2000).

As representatives of the state or defense, trial attorneys are tasked with advocating his or her side of a case while adhering to established legal standards of evidence presented to the court. Decisions concerning use of expert testimony and differing types of scientific evidence are among the most common, and potentially challenging, issues attorneys must evaluate in this context. Despite the great need for credible experts and science evidence, data presented in court sometimes fails to meet scientific and legal expectations of sound evidence. The role attorneys play in vetting expert testimony and scientific evidence is especially important and somewhat lacking in empirical study. The present study has two aims: 1) to describe attorney beliefs concerning important aspects of expert witness credibility and the most valued

* Corresponding author at: Department of Psychology, Sam Houston State University, Huntsville, TX 77341, USA. Tel.: +1 925 360 1942.
E-mail address: hjw006@shsu.edu (H.J. Wechsler).

types of scientific evidence, and 2) to ascertain the role of attorney views of perceived expert credibility and types of science in their decisions to utilize an expert at trial. As such, we offer reviews of the foundations of expert credibility, role of social and forensic science in the courtroom, and state of legal professionals' knowledge concerning these issues.

1. Empirically-supported indicators of perceived expert witness credibility

Given the adversarial nature of the legal system, evidence is often presented to the court in a “battle-of-the-experts situation” (Greenberg & Wursten, 1988, p. 374). Legal decision makers are often faced with the task of deciding which expert is the most credible in order to determine which evidence to accept at face value. Subjective determinations about a witness's credibility are known to impact the persuasiveness of the expert witness's testimony in the courtroom; moreover, perceptions of expert credibility can influence verdict and sentencing recommendations (Brodsky et al., 2010). Furthermore, literature on persuasion suggests jurors may not engage in careful scrutiny of expert testimony upon hearing evidence which they may not have the preparation or background to fully comprehend (Cooper, Bennett, & Sukel, 1996). Especially with complex expert testimony, jurors may rely on the expert's credentials rather than evaluating the validity of the scientific testimony by thoroughly analyzing it (Cooper et al., 1996).

Source credibility exists at the root of witness credibility research. McCroskey and Young (1981) identified two central domains of source credibility: competency and character. More recent work indicates that perceptions of expert witness credibility are comprised of expert trustworthiness, confidence, likeability, and knowledge (Brodsky et al., 2010; Cramer, DeCoster, Harris, Fletcher, & Brodsky, 2011). Moreover, perceptions of expert witness credibility are also influenced by various factors including believability and credentials (Brodsky et al., 2010; Shuman, Champagne, & Whitaker, 1996a,b; Shuman et al., 1996a,b). Boccaccini and Brodsky (2002) illustrated this point; they found that, in a survey of 488 adult community members, expert witnesses were rated as most believable if they were from the same community as the participants, had previously testified for both the prosecution and the defense, and were not paid for their testimony. On the other hand, community members found experts who are from neighboring communities, who mostly write books, who testified previously for only the defense or the prosecution, and who charge a significant amount of money for their testimony to be less believable (Boccaccini & Brodsky, 2002).

The manner in which these indicators of perceived credibility affect legal decisions is often complicated. For instance, social science and legal scholars alike (e.g., Brodsky, 1999; Cramer, Brodsky, & DeCoster, 2009; Slovenko, 1999) note that expert witness confidence is a prominent factor in jury decision making. Moreover, aspects of credibility such as confidence and likeability may be assessed through verbal and nonverbal cues (Brodsky, Neal, Cramer, and Ziemke, 2009; Cramer et al., 2011). However, research has indicated that effects of perceived credibility (overall and facets such as confidence) is dependent upon the legal decision and nature of the expert at hand (Champagne, Shuman, & Whitaker, 1992; Cramer et al., 2011; Rogers, Bagby, Crouch, & Cutler, 1990). One particular study found that mock jurors rate medium- and high-confidence witnesses highly in perceived credibility; however, the jurors found the medium-confidence witnesses to be more credible than the high-confidence witnesses (Cramer et al., 2009). In contrast, judges and lawyers prefer experts who are highly confident (Champagne et al., 1992). An emerging body of literature on applied studies of witness behaviors during testimony builds on existing foundations of credibility. Collectively, these studies articulate a list of empirically-supported lay and expert witness behaviors associated with credible or believable witnesses (e.g., Brodsky et al.,

2009; Cramer et al., 2009; Neal & Brodsky, 2008; Boccaccini, Gordon, & Brodsky, 2003, 2005).

A natural question for attorneys arises based on this literature: What empirically-supported factors of perceived credibility do (or should) trial attorneys attend to in selecting an expert to use at trial? The present study evaluates the nature of attorney views of perceived expert witness credibility, as well as how these perceptions impact potential selection of an expert. A related, and potentially interacting, variable to consider in selection of an expert is the type of scientific data being offered during testimony. We review this topic next.

2. Acceptance of scientific evidence in the courtroom

While credibility judgments are invariably important to factor into decisions concerning usage of expert witnesses, so too is the type of evidence offered. For the purpose of the present study we focus on social science and forensic science expert witnesses who testify in criminal cases. Notably, types of scientific expertise may be received differently by the court. Accordingly, a focus group on scientific and forensic evidence in the courtroom emphasized the important role attorneys play in the courtroom's scientific acceptance process (McClure, 2007). In the following sections we highlight the nature of acceptance of these types of evidence.

2.1. Social and forensic science evidence in the courtroom

Criminal cases often present issues of social fact, defined by Acker (1990) as “general, empirical propositions about social events or relationships that may be instrumental to legal rule-making” (p. 25–26). For the purposes of the current study, social science research includes empirical findings from a number of scientific disciplines, including psychology and sociology. Social science research can influence court decisions in a number of ways (Roesch, Golding, Hans, & Reppucci, 1991). Besides expert testimony, a few ways in which this may happen include: when judges cite published data as secondary sources for their opinions, when formal briefs are brought directly to the attention of the courts, or when (perhaps most commonly) judges cite prior legal decisions to substantiate their opinion (Roesch et al., 1991). Additionally, Roesch et al. (1991) asserted that judges might be more reluctant to rely on social science evidence presented in court because they are generally unfamiliar with research methodology, which suggests an innate inclination toward reliance on legal scholarship and precedent during decision making. Furthermore, judges may be reluctant to use social scientific expert testimony because it is time consuming and expensive. Because many criminal defendants are indigent, the state is often left to the pay for the expert's testimony – if an expert is made available at all (Saltzburg & Capra, 2000).

Expert testimony may be the best way to introduce social science evidence in the courtroom because it allows judges to determine the relevancy of testimony, the experts to educate the court regarding complex literature, and judges to evaluate the evidence subject to cross-examination (see Tremper, 1987 for a review, as cited by Roesch et al., 1991). Taking this into consideration, scholars question the ability of experts to present accurate and unbiased accounts of the scientific literature under the pressures of the adversarial legal system (Saks, 1990), while also doubting the ability of judges and juries to interpret and weigh scientific information presented by individuals within an adversarial format (Roesch et al., 1991).

Specific to social scientific mental health expertise, the legal community's view of the appropriate role for mental health expertise is conflicted, if not paradoxical (Edens et al., 2012). Concerning social science's place in the courtroom, sentiment varies from regarding experts as essential to addressing certain legal issues, to viewing the experts with suspicion, disdain, or hostility (Edens et al., 2012). Despite an increase in improving the quality and objectivity of social science testimony in the last few decades (Shuman & Greenberg, 2003), the legal

community continues to express concerns with sizeable regularity (Edens et al., 2012). Evolving admissibility standards, as set forth in *Daubert v. Merrell Dow Pharmaceuticals and Inc.* (1993), attempt to regulate and monitor social science and other testimony in the courtroom; however, it appears that these standards may have little impact on what constitutes mental health “expertise” in the courtroom (Edens et al., 2012; Fed. R. Evid. 702, 2000; Redding & Murrie, 2007).

Why does social science have potentially little acceptance or impact in court? This may be due in part to judges' general lack of understanding of what qualifies as sound scientific evidence (Gatowski et al., 2001; Kovera & McAuliff, 2000). Furthermore, Redding, Floyd, and Hawk (2001) found that judges and lawyers may not fully understand the relevance of statistical or actuarial data associated with social science evidence. This is consistent with Redding and Reppucci's (1999) findings that judges and lawyers often did not appreciate the value of social science research evidence. In regards to judicial decision making, it has been suggested that judges' socio-political attitudes take part in their judgments about the relevance of scientific evidence presented in the courtroom (Redding & Reppucci, 1999). Further, Perlin (1991, 1993) asserts that “the legal system selectively – teleologically – accepts or rejects social science data depending on whether or not the use of that data meets the a priori needs of the legal system” (Perlin, 2013, p. 879). In essence, the acceptance of such data is confirmatory in nature, in that it is privileged when it supports the fact finder's preconceived conclusion, but subordinated when the data is inconsistent with the preferred conclusion (La Fond & Durham, 1992). In addition, legal standards that are in place as an attempt to regulate social science evidence in court may be falling short due to the common disinclination to apply these standards to what has been deemed “soft psychological evidence” (Dahir et al., 2005; Edens et al., 2012, p. 3). Because of the common proclivity toward perceiving social science as “soft”, some decision makers may be less likely to consider this type of evidence as comparable to what may be considered “hard” or natural science. Indeed, in a recent review of the state of forensic psychology, Heilbrun and Brooks (2010) highlighted that the field, and by inference, social sciences, have yet to achieve a long-standing goal of properly educating the legal field on the nature and application of forensic psychological evidence in the court.

Forensic science evidence, in addition to social science, is presented to the court on a regular basis in criminal trials (Heilbrun & Brooks, 2010). In the eyes of Congress, the courts, and the science community, “forensic science” includes sub-disciplines of chemistry, biochemistry, biology, medicine, and crime scene investigation (Heilbrun & Brooks, 2010; National Research Council, 2009). Notably, psychology is absent from the definition, considered instead as social science (see above). Forensic science experts commonly testify regarding DNA evidence and other types of evidentiary sciences, including blood typing (i.e., serology) in criminal cases to prove guilt or innocence. For instance, with the growing availability and sophistication of DNA technology, this type of scientific evidence is contributing in large part to a growing number of exonerations in America (Gross, Jacoby, Matheson, Montgomery, & Patil, 2005).

As judges are scientific gatekeepers, a potential for differential application of *Daubert* criteria to various domains of expert testimony and knowledge may exist when comparing social and forensic science evidence in the courtroom. While forensic science sits well within the boundary of what is considered valid science within the legal arena, some types of social science evidence may, by comparison, lie somewhere among the fringes of what is and is not considered “science” (Gatowski et al., 2001). Consequently, legal decision makers may consider the types of scientific evidence differently during decision making, and as a result, attorneys may take special precautions when selecting which type of expert to hire for their case. It is often the case that the attorney must expend significant resources, including time and energy, toward identifying the right expert, evaluating the expert in terms of the context of the case, and finally in making the determination as to

whether or not the expert should be retained for the specific case's needs (Willinger, 1999).

3. The role of expert opinion in perceptions of science

In the adversarial legal system, forensic analysts' testimony sometimes goes further than the science allows (Innocence Project, 2001). In fact, in more than half of all DNA exonerations, unvalidated or improper forensic science has been found to have contributed to the wrongful conviction. A multitude of forensic techniques are widely practiced, but have not been subjected to the rigors of scientific research (e.g., hair microscopy, bite mark comparison). However, judges and juries often mistakenly accept testimony concerning these methods as fact.

Often, it is up to the attorney to determine what kinds of testimony should be presented at trial. Furthermore, it is sometimes the case that attorneys who are invested in their case prioritize the obtaining of a win at trial as opposed to the regulation of expert testimony (Welner, Mastellon, Stewart, Weinert, & Stratton, 2012). As such, vetting forensic expert witnesses may be limited to the direct and cross-examination of opposing witnesses, as opposed to more thorough witness preparation (Welner et al., 2012). According to Welner et al. (2012), “limiting corruption and conscious expert witness subterfuge and its devastating impact on a case is not a responsibility actively taken on by courts” (citing Wettstein, 2005, p. 2). As improper forensic expert testimony continues in the courtroom, the potential for wrongful convictions persists (Innocence Project, 2001).

Allegations of bias specific to social science mental health experts exist within the legal system as well (Edens et al., 2012). Because the points presented to the court may be less often documented with softer sciences, Welner et al. (2012) argued this may allow expert witnesses to exploit the court's lack of social scientific expertise. Accordingly, trial attorneys who have witnessed this sort of “frivolous testimony” may be more likely to regard expert witnesses with cynicism (Welner et al., 2012, p. 3). Concerning types of bias, Edens et al. (2012) identified a large number of cases in which financial bias was specifically alleged, with references to experts labeled as hired guns, prostitutes, or mercenaries. Their results suggest that these allegations of bias among mental health experts are common. Additional accusations of bias pertained to experts acting as advocates and presenting pseudoscience (Edens et al., 2012). In all, no matter the type of evidence, there appears the potential for perception of expert opinion to mitigate the acceptance of scientific evidence in court.

3.1. The present study

Scientific literacy is an important issue to consider, bearing in mind that many judges, juries and attorneys have little to no scientific training yet allow into court and make decisions based on scientific evidence. Indeed, a growing body of literature depicts poor fact finder and legal decision maker skill in assessing the quality, validity, and usefulness of scientific data (e.g., Kovera & McAuliff, 2000; Lehman, Lempert, & Nisbett, 1988; Vidmar, 2005). The reality may be that problems in understanding scientific evidence often start with the lawyers who provide the experts and help to shape and organize their testimony before and during trial (Vidmar, 2005).

Through a general survey and an experimentally manipulated vignette, the present study evaluates attorney views of, and preferences for empirically-supported indicators of perceived expert credibility. We do so via attorney ratings of importance of empirically-supported indicators (e.g., Boccaccini & Brodsky, 2002; Brodsky et al., 2010), as well as a likelihood ratings of an experimental manipulation of high versus low credibility experts. Moreover, we examine attorney beliefs about, and preference for, differing types of scientific evidence (as defined by social versus forensic science) in a similar manner as credibility. Also, through an accompanying survey, we assess prevailing

attorney experience with, and beliefs concerning, expert testimony, expert errors, and differing types of science errors.

The hypotheses are as follows: Descriptive/correlational analyses:

H1. We expect attorneys to show preference for empirically-supported indicators of expert witness credibility, as evidenced by generally high importance ratings of those empirically-supported indicators.

H2. We expect attorneys to show preference for hard science, over social science as evidenced by frequency of support for hard science evidence over psychological science evidence or testimony.

H3. We expect attorneys to display favorable self-views in terms of ability to evaluate reliability of scientific evidence and lower perceived frequency of expert errors in their own cases, when compared to other attorneys' ability to evaluate reliability of scientific evidence and estimated frequency of errors in other attorneys cases, respectively.

Experimental analyses:

H1. We expect that, compared to a low credibility expert witness, a highly credible expert (i.e., as determined by the experimental manipulation described below) will be viewed significantly more favorably by attorneys (i.e., greater likelihood of use and anticipated credibility in the eyes of fact-finders).

H2. We expect that, compared to social science testimony, forensic science testimony will be viewed significantly more favorably by attorneys.

H3. We expect a significant interaction to emerge between expert credibility and type of scientific testimony, such that the combination of high credibility and forensic science testimony will yield the most favorable attorney judgments. Also, we expect that the combination of low credibility and social science testimony will yield the least favorable attorney judgments.

4. Method

4.1. Participants

Participants consisted of seventy-eight attorneys (thirty-eight females, forty males, $M_{age} = 42.94$, $SD = 11.16$). The sample was predominantly Caucasian ($n = 67$, 86%) and primarily practiced law in the southern United States ($n = 64$, 82%). The sample was slightly liberal ($M = 5.27$, $SD = 2.20$) as indicated by a ten-point Likert scale with higher scores on the scale indicating more liberal political beliefs.

4.2. Measures

4.2.1. Vignette/evidence type and expert credibility manipulation

Each participant reviewed one of four randomly assigned vignettes. The presented vignette was manipulated in a 2 (forensic science versus social science evidence) $\times$ 2 (low versus high credibility) design. Based on the literature review of empirically-supported indicators of perceived expert credibility, the following variables were manipulated between credibility vignettes (high variable followed by low variable in parentheses): educational degree of the expert (i.e., Ph.D. or M.A.), length of occupational experience (i.e., twenty years or two years), history of success when testifying (i.e., good success or varying success), reputation among colleagues (i.e., recommended by colleagues or referred by colleagues), number and quality of publications (i.e., fifty articles in peer-reviewed journals or three articles with no mention of peer-reviewed journals), number of court cases the expert has testified in (i.e., twenty or five), side he usually testifies for (i.e., defense and prosecution or only one or the other), and testifying fee (i.e., \$200/h with some cases pro bono or \$600/h). The type of science manipulation consisted of statements that the testifying expert possessed either a degree in clinical psychology with a private practice in the area, or a degree

in molecular biology with a private consulting firm in the area. Also, the individual's expertise differed with the type of science manipulation so that the social science expert was an expert on eyewitness identification and the forensic science expert was an expert on DNA evidence and human clinical genetics.

4.2.2. Questions regarding the manipulated/experimental expert testimony

Following the vignette, attorneys rated how likely they would be to use the expert presented in the vignette on a ten-point Likert scale. They were then asked to rate on a similar Likert scale how credible they believe the judge and jury will find the expert presented in the vignette. Next, they rated the following variables on how influential they were in their decision about whether or not to use the expert: number of publications, nature of content of testimony, testifying history, degree, years of experience, and the expert's fee. Following these questions, participants rated the extent to which they believe their prior and current occupational experiences influenced their decision.

4.2.3. Demographics

Basic demographic questions were asked after the participants read the vignettes and answered subsequent related questions regarding the expert witness and the evidence presented to the court. Demographic information asked for in this portion of the survey included: race, political orientation, and primary geographic location of legal practice.

4.2.4. Survey questions regarding scientific evidence

Subsequent to the demographics section of the survey, participants answered a series of questions about past usage of different types of expert testimony in past trials. Specifically, questions were asked regarding the attorneys' beliefs about errors made by experts. In particular, participants were asked to estimate the frequency of certain types of errors pertaining to forensic science (e.g., contamination of evidence, evidence suppression, statistical exaggeration) in their own cases and in cases in general. Following that set of questions, attorneys were queried about their own confidence in their ability to determine the validity of scientific evidence presented in trial. Furthermore, they rated their confidence in their own abilities as well as other attorneys' abilities to determine the validity of scientific evidence testimony on a ten-point Likert scale.

4.2.5. Survey questions regarding expert selection and credibility

Next, the attorneys rated twenty different factors on a ten-point Likert scale pertaining to the selection of an expert. The final two questions in the questionnaire asked the attorneys to indicate whether they believe psychological evidence or other scientific evidence is generally more influential and more credible in court.

4.2.6. Procedure

Data collection occurred either in person or through an online survey that was distributed to attorneys through the National Association of Criminal Defense Lawyers. In person data collection occurred at attorney conferences in North Carolina and North Dakota where the third author presented a talk to attorneys attending the conferences. After providing informed consent (either online or in person), the attorneys received a packet containing the vignette and questionnaire. After completing the questionnaire, the attorneys were debriefed and thanked for their participation. No incentives were provided to the attorneys to participate in the study.

5. Results

5.1. Descriptive/correlational analyses

H1: Attorney preference for empirically-supported indicators of expert credibility was evaluated in two ways. First, descriptive statistics were run to evaluate the relative value of each potential credibility

indicator; higher values on the ten-point scale indicate greater value to the attorney in selecting an expert witness. Second, descriptive statistics were again obtained for the perceived importance of specific expert characteristics contained in the experimental manipulation; higher values on the 10-point scale again suggest greater perceived importance of that facet of choosing an expert witness.

Table 1 displays the descriptive statistics and rank order for both general empirically-indicated aspects of expert credibility and vignette-specific expert characteristics. Notably, perceived expert trustworthiness ($M = 9.06, SD = 1.23$), communication skills ($M = 8.55, SD = 1.43$), content of testimony/report ($M = 8.30, SD = 1.83$), and type of work in the field ($M = 7.97, SD = 1.60$) were the most valued aspects in attorneys' selection of an expert (based on anticipated credibility). Among the lowest valued aspects of expert credibility were ethnicity ($M = 1.63, SD = 1.41$), gender ($M = 1.67, SD = 1.38$), home area of the expert ($M = 3.93, SD = 2.46$), and testifying fee ($M = 4.94, SD = 2.94$). Concerning vignette-specific expert characteristics impacting attorney selection of the expert, content of testimony, years of experience, testifying experience, and degree appeared approximately equally valued. Number of publications and expert fee were among the least valued in terms of attorney selecting the expert.

H2: Attorney preference for type of science was evaluated via rated percentages of attorney preference for types of scientific evidence: a) the trier of fact may find influential, and b) type of scientific expert the attorney believes to be more credible. Fig. 1 displays percentages by type of scientific evidence preferred. Attorneys overwhelmingly preferred other types of scientific evidence and testimony compared to valuing equally or favoring psychological evidence or testimony, respectively. Only 2.7% of the entire sample favored psychological evidence or testimony.

H3: Attorney confidence in detecting the reliability of scientific evidence was evaluated with a paired-samples t-test comparing views of their own ability versus beliefs about other attorneys in general. Likewise, paired-samples t-tests were employed to evaluate attorney perceptions of frequency of expert errors in their own versus other attorneys' cases, both overall and specific types of expert errors.

Table 1

Descriptive statistics for attorney valuing of empirically-indicated aspects of expert credibility and case-specific expert characteristics in the experimental case.

	Mean (SD)	Rank
<i>Empirically-indicated aspects of expert credibility</i>		
Perceived knowledge	7.97 (2.14)	5
Perceived confidence	7.50 (1.99)	8
Perceived likeability	7.26 (2.08)	9
Perceived trustworthiness	9.06 (1.23)	1
Attire	5.63 (2.42)	14
Communication skills	8.55 (1.43)	2
Degree	7.56 (1.72)	7
Years of experience	7.76 (1.71)	6
Number of publications	5.46 (2.11)	15
Whether or not expert is from jury's home community	3.93 (2.46)	17
Number of times expert has testified	6.42 (2.14)	13
Gender	1.67 (1.38)	18
Ethnicity	1.63 (1.41)	19
Local reputation	7.21 (1.87)	10
National reputation	6.54 (2.27)	12
Testifying fee	4.94 (2.94)	16
Side(s) expert typically testified for	6.73 (2.30)	11
Conclusions to be Offered in testimony or report	8.30 (1.83)	3
Type of work in the field	7.97 (1.60)	4
<i>Case-specific characteristics of expert in vignette</i>		
Number of publications	5.20 (2.55)	5
Nature/content of testimony	7.44 (2.34)	1
Testifying history	7.22 (2.20)	3
Degree	7.00 (2.18)	4
Years of experience	7.40 (2.21)	2
Expert's fee	5.17 (3.14)	6

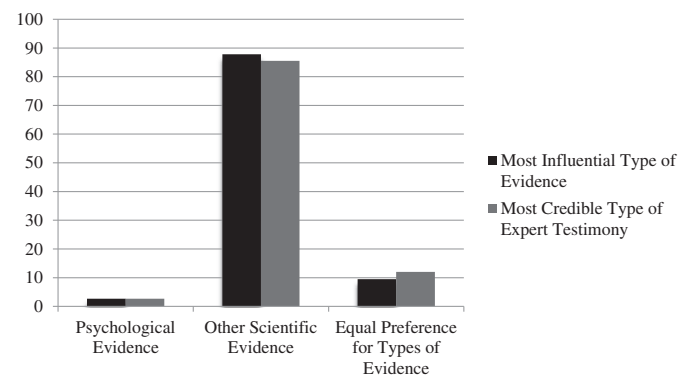


Fig. 1. Percentage of attorneys favoring psychology versus other types of science.

Results comparing confidence in evaluating reliability of scientific evidence offered by experts suggested that attorneys rated their abilities significantly higher ($M = 6.35, SD = 2.14$, Cohen's $d = 0.66$) than other attorneys' ($M = 5.07, SD = 1.72$) abilities, $t(70) = 5.36$, $p < .001$. Table 2 contains paired-samples t-test results comparing attorney perceptions of frequency of expert errors in their own cases versus other attorneys' cases. Across all types of errors, attorneys believe experts make errors significantly more often in other attorneys' cases in general than in their own cases. Notably, effect sizes range between -0.81 and -1.02 , suggesting rather large differences in these perceptions.

5.1.1. Experimental analyses

A set of analysis of variance (ANOVAs) were conducted to examine the experimental hypotheses. Hypothesis one and two were supported by the data; attorneys were significantly more likely to hire ($F(1, 76) = 27.29$, $p < .001$, $\eta^2 = .28$) the expert described as more credible ($M = 7.02$, 95% CI [6.35, 7.89]) than the expert described as less credible ($M = 4.41$, 95% CI [3.67, 5.15]). Attorneys perceived the expert described as more credible to be more credible ($M = 7.33$, 95% CI [6.75, 7.91]) than the expert described as less credible ($M = 5.38$, 95% CI [4.74, 6.03]), $F(1, 76) = 19.88$, $p < .001$, $\eta^2 = .22$. Attorneys also were more likely to hire the forensic science expert ($M = 6.34$, 95% CI [5.65, 7.03]) than the social science expert ($M = 5.09$, 95% CI [4.37, 5.81]), $F(1, 76) = 6.29$, $p = .01$, $\eta^2 = .08$. However, the attorneys did not perceive the social science expert to be less credible than the forensic science expert ($p > .05$). The expected two-way interaction between credibility and type of science also did not emerge.

6. Discussion

The primary purposes of the present study were as follows. First, we investigated attorney opinions concerning types of scientific evidence, as reflected by ratings of type of scientific evidence that would be perceived as credible and influential, as well as experimental evaluation of type of expert that would be hired to testify. Second, we assessed attorney beliefs concerning empirically-supported indicators of expert witness credibility, as reflected by experimental manipulation of high versus low credibility experts, as well as attorney perceptions of importance of, and preference for, known indicators of expert credibility. Third, as an exploratory feature, we investigated attorney beliefs concerning their ability to detect errors in, or evaluate the validity and reliability of, scientific evidence. We address major findings for each goal in turn, concluding with implications and future directions.

6.1. Preferences for type of scientific evidence

Results of the current study suggest attorneys display clear preferences for forensic science over social science in terms of the perceived

Table 2

Attorney perceptions of expert errors (overall and specific types of errors) in their own versus other attorneys' cases.

Type of error	In own cases	In general	T(df), <i>p</i> -value	Cohen's <i>d</i>
Expert errors overall	2.52 (1.70)	4.11 (1.86)	−6.98 (80), <i>p</i> < .001	−0.89
Expert testified to tests never conducted	1.19 (0.85)	2.31 (1.42)	−6.86 (57), <i>p</i> < .001	−0.96
Contamination of evidence	1.40 (1.07)	2.72 (1.82)	−5.36 (57), <i>p</i> < .001	−0.88
Falsified results/fabricated evidence	1.14 (1.02)	2.26 (1.50)	−7.02 (57), <i>p</i> < .001	−0.87
Expert misrepresented credentials	1.44 (1.27)	3.14 (2.01)	−7.29 (56), <i>p</i> < .001	−1.01
Evidence suppression/withholding evidence	1.78 (1.58)	3.22 (1.95)	−5.58 (57), <i>p</i> < .001	−0.81
Misrepresentation of evidence	2.22 (2.09)	4.10 (2.50)	−5.93 (57), <i>p</i> < .001	−0.81
Statistical exaggeration	2.14 (2.00)	4.40 (2.39)	−6.80 (57), <i>p</i> < .001	−1.02
Use of techniques failing to satisfy scientific acceptability	2.07 (1.80)	3.73 (2.23)	−5.78 (55), <i>p</i> < .001	−0.82

Note: Values reported as mean (*SD*).

influence of a particular type of scientific evidence, as well as expert testimony. Almost 88% of attorneys indicated they preferred forensic science as opposed to social science, while less than 10% reported an equal preference. Less than 3% of the attorneys surveyed designated psychological science as the most influential type of evidence. This dismissal of the importance of social science is alarming considering psychology's impact on the law has been substantial in some cases (i.e., *Ballew v. Georgia*, 1978; *Maryland v. Craig*, 1990) in the past (Redding & Reppucci, 1999). Psychologists and other social scientists have made important discoveries about eyewitness testimony, legal safeguards and evidentiary standards, judges and juries, punishment and sentencing, and other legal matters that could greatly benefit attorneys, their clients, and the legal system.

Perhaps most famously, the Court recognized psychological data in its decision to overturn segregation in *Brown v. Board of Education* (1954), which had a powerful effect on social scientists, and portrayed the Supreme Court as willing to consider social scientific empirical facts seriously (Haney & Logan, 1994). While efforts of effectively utilizing social science in legal decision-making have persisted, scholars still have argued “courts seem particularly averse to social science, displaying hostility toward it... and rejecting science as no more reliable than intuition” (Tanford, 1990, p. 151).

The acceptance of social science empirical data in the courtroom continues to face its challenges. For example, in the landmark case which temporarily ruled that the death penalty was cruel and unusual punishment (i.e., *Furman v. Georgia*, 1972), the Court “explicitly acknowledged the legitimacy and relevance of empirical data” collected by social scientists (Haney & Logan, 1994, p. 76). However, social science's impact on the death penalty was substantial, yet short lived. Haney and Logan (1994) argue that this ruling served to be a “false promise” for social scientists who intended to make important contributions to the legal field, as researchers were met with increased hostility by the Court, particularly regarding empirical evidence related to capital litigation (p. 76). It seems that despite the significant advances social science has made in the attempt to integrate empirical data into legal decision making, some amount of distrust endures. The results of the current study correspond with this reluctance to rely upon social science. Therefore, it is possible that attorneys miss the potential impact of empirical data in their cases because they are less willing to utilize evidence pertaining to social science.

Attorneys displayed a parallel preference for forensic science expert testimony. Over 85% of attorneys indicated forensic science expert testimony was the most credible, while 12% did not indicate a preference for either type. Again, less than 3% of the attorneys indicated psychological science was the most credible type of science, suggesting the vast majority of attorneys believe psychology-related expert testimony is less credible, reflecting known stigma of “soft science” (Hedges, 1987; Howard, 1993) evidence among legal professionals. These results are perhaps not surprising given existing bodies of literature which have investigated the court's mistrust of social science research, as well as their reluctance to rely upon it (Redding & Reppucci, 1999; Roesch et al., 1991). According to Redding & Richard (1998), efforts to influence

judicial decision making through the presentation of social science has not been widely successful, particularly not as successful as many social scientists had hoped. This could be in larger part due to attorneys' cautiousness and skepticism regarding social science testimony, despite the important contributions experts could potentially make to their cases. According to Edens et al. (2012), concerns about mental health expertise continue to be conveyed consistently within the legal community. In a survey of law students, judges, and attorneys, Kovera and McAuliff (2000) reported that many respondents made negative comments about social science experts. The results of their survey identified the following common sentiments: “You can find an expert to support any theory, that experts and researchers are biased as a function of their own beliefs or who is paying them to testify, and that statistics and social science are inherently unreliable” (p. 47). These are the types of beliefs that likely contribute to the present study's findings regarding attorneys preferences, or lack thereof, for social science expert testimony.

Current findings suggest attorneys are also more likely to hire a forensic expert over a social science expert, even when factors related to expert credibility remain comparable. Despite this, social science experts were not perceived differentially in terms of credibility in comparison to forensic science experts. Coupled with views that forensic science is more credible/influential in general, this pattern may suggest that the type of science, not distrust of the testimony itself, drives perceptions of scientific evidence. This supposition is in contrast to other research that has indicated that mental health experts are still regarded by some attorneys with a significant degree of suspicion (Fradella, Fogarty, & O'Neill, 2003). Previously investigated sentiments such as these, as well as the potential for overt disdain and hostility directed at mental health experts (Edens et al., 2012), could also provide a plausible explanation for our set of findings.

6.2. Empirically-supported indicators of expert credibility

Attorneys in the present study appear to be relatively on track with regard to appropriately valuing empirically-supported aspects of expert credibility. Specifically, they were more likely to retain experts possessing high credibility credentials in the experimental analyses; while this fact is not entirely surprising, it potentially suggests that attorneys appropriately rely on research-supported factors of credibility. While judges are ultimate gatekeepers of testimony at trial (*Daubert v. Merrell Dow Pharmaceuticals & Inc.*, 1993), the ability for attorneys to effectively vet expert witnesses is important, as they play a pivotal role as the legal individuals who select what testimonial evidence is to be presented at trial (Slovenko, 1987). Attorney identification of research-supported credible experts begs the question of which factors they do and do not value in selecting or vetting an expert.

Based on ratings of credibility elements in the experimental manipulation, as well as the general list of important factors, attorneys appear to place great value on the following set of credibility indicators: a) within the case-specific vignettes — content and nature of the testimony, as well as the experts' years of experience, b) more generally,

the highest value was placed on perceived expert trustworthiness, followed by communication skills, conclusions to be offered in the testimony or report, the type of work in the field, and perceived knowledge. This list dovetails well with expert witness credibility theory (Brodsky et al., 2010), noting trustworthiness and knowledge do impact fact finder positions (e.g., Brodsky et al., 2010; Cramer et al., 2009). Moreover, attorney valuing of general expert characteristics of years of experience, content of testimony, and communication skills are supported by the literature of credible testimony (e.g., Boccaccini & Brodsky, 2002; Cramer et al., 2011; Neal & Brodsky, 2008). Notably, if attorneys continue to base expert selection on empirically-supported characteristics, they can potentially take the next step of enhancing modifiable expert characteristics (e.g., communication skills) through witness preparation.

Several research-derived aspects of credibility were noticeably devalued by attorneys. The least valued aspects of credibility included ethnicity and gender. This result may reflect our sample's somewhat liberal political views or perhaps their reluctance to admit prejudices. Additionally, the expert's fee and his or her number of publications were the two least valued credibility factors among the general list provided to attorneys. Such findings are in line with previous research by Redding et al. (2001) who found that, among judges, defense attorneys and prosecutors surveyed, research evidence was of less interest in comparison to other forms of mental health expertise. Therefore, perhaps prospective experts' past research experience/publications is of little interest to attorneys when vetting expert witnesses.

6.3. Beliefs regarding expert errors and detecting scientific validity/reliability

In spite of attorney abilities to vet experts based on research-supported indicators of credibility, our results suggest that attorneys are not equal in their perceptions of identifying expert errors. Indeed, we observed a pattern in which attorneys surveyed in the current study displayed a self-serving bias in which they consistently estimated that expert errors exist significantly more often in other attorneys' cases than in their own. Essentially, attorneys believe expert errors happen, just not with the experts they have retained. Moreover, this pattern held across a number of specific types of errors (e.g., statistical exaggeration, misrepresentation of credentials) at a considerably large magnitude (see Table 2 for effect sizes). A possible explanation exists in the potential for a bias blind spot (Pronin, Lin, & Ross, 2002), defined as an overwhelming tendency of individuals to report that they are personally less susceptible to biases in comparison to the majority of alike others. Put another way, possibly driven by emotion (Coleman, 2011), this pattern of findings points toward a potential self-serving bias or behavioral tendency among attorneys to be over confident in his or her ability to detect expert errors.

Results also suggested that attorneys rated themselves significantly better than other attorneys at evaluating the reliability of scientific evidence. The self-serving bias may also explain this finding, as well as previous research showing attorneys and other legal professionals possess seemingly unwavering beliefs that they can effectively detect the reliability and usefulness of scientific evidence offered by experts (e.g., Kovera & McAuliff, 2000; Lehman et al., 1988; Vidmar, 2005). These beliefs simply cannot be accurate given our findings that attorneys overstate their confidence in detecting expert errors; statistically speaking, it is not possible that everyone is better at detecting reliability of, or errors in, scientific evidence and testimony than most other attorneys. Self-serving attorney assumptions concerning ability to detect expert errors or limitations in scientific evidence/testimony can be especially problematic given the trial errors many attorneys seem to be underestimating in their own cases include errors involving scientific evidence and expert testimony that are known to contribute to wrongful convictions (Innocence Project, 2001). As the Supreme Court cautioned in *Daubert v. Merrell Dow Pharmaceuticals and Inc.* (1993), "[e]xpert evidence can be both powerful and quite misleading because

of the difficulty in evaluating it". In sum, it is plausible that attorneys assume they are better at evaluating expert evidence than they really are, which could contribute to a series of legal events contributing to wrongful conviction and inaccurate testimony at trial.

7. Limitations

There are several limitations to the present study. First, we did not obtain a representative sample of attorneys. Accordingly, some of our attorney responses may not be representative of attorneys in general. Although obtaining a representative sample of attorneys would be desirable, it would have been difficult and expensive for us to obtain a representative sample. Attorneys are reluctant to participate in surveys especially surveys as the present one that require a significant amount of time to complete. Moreover, any survey of attorneys will consist of volunteers, and they may be more interested in the topic of the survey and more knowledgeable about the topic than non-volunteers.

Another limitation is that the attorneys' responses to the survey may differ in certain respects from how they would evaluate the credibility of an expert in an actual criminal case. No survey or experiment can capture all the complexities, pressures, and factors involved in hiring an expert in an actual criminal case. The final limitation of the present study is that we did not assess attorneys' ability to evaluate the reliability and validity of scientific evidence. More research is needed on this important topic.

8. Implications and conclusions

In brief, attorneys prefer forensic science over social, and specifically psychological, science. Also, attorneys in the present study seem to be fairly competent at vetting experts as far as empirically-based indicators of perceived credibility is concerned. Findings suggest attorneys are able to pinpoint important criteria related to expert credibility, which is no small feat. In short, attorneys are fairly strong at anticipating criteria fact finders will find credible. However, when it comes to the actual scientific evidence to be presented in court by experts, it seems that attorneys may overstate their effectiveness in identifying expert errors in their own cases. It is theorized that a self-serving bias may underlie the pattern of underestimation of expert errors in his or her cases relative to others. Further, while the present study investigated attorney beliefs regarding expert testimony in the context of criminal cases, it is unknown whether similar tendencies would emerge in civil cases. However, given attorneys in the present study were effectively able to identify empirically-based indicators of perceived credibility, it could be expected that a similar amount of competence would be seen in reference to experts in civil cases, especially in light of empirical data suggesting that empirically-supported indicators of expert credibility in civil trial research (e.g., Cooper & Neuhaus, 2000; Swenson, Nash, & Roos, 1984) are often the same as those surveyed in the present study.

Based on the findings regarding preference for forensic science, it is possible one could also come to the conclusion that attorneys are more likely to marginalize the importance of social science research in the courtroom, a concerning supposition given that social science has in the past (and shows much future promise) informed many legal/trial and policy decisions (Haney, 1993). According to Redding and Reppucci (1999), that could be due to the tendency for attorneys to "ignore social science research because it often refutes their (more conservative) socio-political beliefs" (p. 32), a concern echoed by Haney (1993) in his analysis of the role of psychological research has played in facilitating change in legal process. In addition, Bersoff and Glass (1995) point out that the Supreme Court will sometimes ignore or reject social science when it does not support the desired legal result. The legal system's propensity to occasionally misuse or ignore social science data could, in some ways, be reflective of the notion of false "ordinary common sense," a type of judicial decision making which includes heuristic thinking and faulty, self-referential beliefs that others' thoughts, beliefs, or reasoning must

be the same as their own (Perlin, 2013, p. 879). Perlin (2013) asserts that this line of thinking often includes “irrational, unconscious, and bias-driven stereotypes and prejudices” (p. 879), which could provide plausible explanations as to why prior beliefs may impact the way social science is seemingly disvalued in court. Whatever the reason, our results suggest that social science is substantially less preferred. These data suggest the continued need for the education of attorneys, and courtroom personnel in general, regarding the utility of social science in the legal system.

Training specific to attorneys could provide the needed insight into how social science can be effectively used and presented in court. It could also aid attorneys in understanding complex scientific testimony so that they may use the knowledge in a way that would be most effective in specific legal cases. Given attorneys have been found to be particularly disinterested in statistical or actuarial data compared to other types of testimony (Redding et al., 2001) and frequently fail to appreciate the value of research evidence (Redding & Reppucci, 1999) as it relates to social science, it is likely that attorneys would benefit from information pertaining to how such information provides important “social framework” or contextual evidence (Monahan & Walker, 1998).

Training opportunities should not be made specific to social science. Scientific evidentiary errors, including the ones the attorneys in the present study considered, exist in forensic science as well. While social science may be largely undervalued in the legal system, forensic science is typically considered a “truth machine” (Kreimer, 2005, p. 655) or a gold standard in courtroom evidence. Though results suggest attorneys acknowledge these types of errors occur, they likely underestimate the frequency with which they are occurring in their own cases. Therefore, training regarding the types of expert errors that occur, basic recognition of scientific validity and reliability, potential contributions of attorneys (as those who may accidentally allow poor evidence at trial) to false convictions via expert errors, as well as how to recognize personal or self-serving biases in detecting expert errors may prove extremely beneficial. With increased awareness regarding the utility of scientific evidence in the courtroom, in addition to how to detect flawed testimony, perhaps attorneys will be better able to make informed decisions about experts that will not only benefit their clients but also the legal system.

References

- Acker, J. R. (1990). Social science in Supreme Court criminal cases and briefs: The actual and potential contribution of social scientists as amici curiae. *Law and Human Behavior*, 14(1), 25–42.
- Ballew v. Georgia, 435 U.S. 223 (1978)
- Bersoff, D. N., & Glass, D. J. (1995). The not-so Weisman: The Supreme Court's continuing misuse of social science research. *University of Chicago Law School Roundtable*, 2(1), 279–302.
- Boccaccini, M. T., & Brodsky, S. L. (2002). Believability of expert and lay witnesses: Implications for trial consultation. *Professional Psychology*, 33, 384–388.
- Boccaccini, M. T., Gordon, T., & Brodsky, S. L. (2003). Effects of witness preparation on witness confidence and nervousness. *Journal of Forensic Psychology Practice*, 3, 39–51.
- Boccaccini, M. T., Gordon, T., & Brodsky, S. L. (2005). Witness preparation with real and simulated criminal defendants. *Behavioral Sciences and the Law*, 23, 659–687.
- Brodsky, S., Neal, T., Cramer, R., & Ziemke, M. (2009). Credibility in the courtroom: How likeable should an expert witness. *Journal of American Academy of Psychiatry and the Law*, 37, 525–532.
- Brodsky, S. L. (1999). *The expert witness: More maxims and guidelines for testifying in court*. Washington, DC: American Psychological Association.
- Brodsky, S. L., Griffin, M. P., & Cramer, R. J. (2010). The witness credibility scale: An outcome measure for expert witness research. *Behavioral Sciences & the Law*, 28, 892–907.
- Brown v. Board of Education, 347 U.S. 483 (1954).
- Champagne, A., Shuman, D., & Whitaker, E. (1992). An empirical examination of the use of expert witnesses in American courts. *Jurimetrics Journal*, 31, 375–392.
- Coleman, M. D. (2011). Emotion and the self-serving bias. *Current Psychology: A Journal For Diverse Perspectives On Diverse Psychological Issues*, 30(4), 345–354. <http://dx.doi.org/10.1007/s12144-011-9121-2>.
- Cooper, J., Bennett, E. A., & Sukel, H. L. (1996). Complex scientific testimony: How do jurors make decisions? *Law and Human Behavior*, 20(4), 379–394. <http://dx.doi.org/10.1007/BF01498976>.
- Cooper, J., & Neuhaus, I. M. (2000). The ‘Hired Gun’ effect: Assessing the effect of pay, frequency of testifying, and credentials on the perception of expert testimony. *Law and Human Behavior*, 24, 149–171. <http://dx.doi.org/10.1023/A:1005476618435>.
- Cramer, R. J., Brodsky, S. L., & DeCoster, J. (2009). Expert witness confidence and juror personality: Their impact on credibility and persuasion in the courtroom. *Journal of American Academy of Psychiatry and the Law*, 37, 63–74.
- Cramer, R. J., DeCoster, J., Harris, P. B., Fletcher, L. M., & Brodsky, S. L. (2011). A confidence-credibility model of expert witness persuasion: Mediating effects and implications for trial consultation. *Consulting Psychology Journal: Practice and Research*, 63(2), 129–137. <http://dx.doi.org/10.1037/a0024591>.
- Dahir, V. B., Richardson, J. T., Ginsburg, G. P., Gatowski, S. I., Dobbin, S. A., & Merlino, M. L. (2005). Judicial application of Daubert to psychological syndrome and profile evidence: A research note. *Psychology, Public Policy, and Law*, 11, 62–82. <http://dx.doi.org/10.1037/1076-8971.11.1.62>.
- Daubert v. Merrell Dow Pharmaceuticals, Inc., 516 U.S. 869 (1993).
- Edens, J. F., Smith, S., Magyar, M. S., Mullen, K., Pitta, A., & Petrila, J. (2012). “Hired guns”, “charlatans”, and their “voodoo psychobabble”: Case law references to various forms of perceived bias among mental health expert witnesses. *Psychological Services*. <http://dx.doi.org/10.1037/a0028264>.
- Fed. R. Evid. 702 (2000). *Amendment Advisory Committee Note*.
- Fradella, H., Fogarty, A., & O'Neill, L. (2003). The impact of Daubert on the admissibility of behavioral science testimony. *Pepperdine Law Review*, 30, 403–444.
- Furman v. Georgia, 408 U.S. 238 (1972)
- Gatowski, S. I., Dobbin, S. A., Richardson, J. T., Ginsburg, G. P., Merlino, M. L., & Dahir, V. (2001). Asking the gatekeepers: A national survey of judges on judging expert evidence in a post-Daubert world. *Law and Human Behavior*, 25, 433–458. <http://dx.doi.org/10.1023/A:1012899030937>.
- General Electric v. Joiner, 522 U.S. 136 (1997)
- Gould, J., Martindale, D., Tippins, T., & Wittman, J. (2011). Testifying experts and non-testifying trial consultants: Appreciating the differences. *Journal of Child Custody*, 8, 32–46.
- Greenberg, J., & Wursten, A. (1988). The psychologist and the psychiatrist as expert witnesses: Perceived credibility and influence. *Professional Psychology*, 19, 373–378.
- Gross, S. R., Jacoby, K., Matheson, D., Montgomery, N., & Patil, S. (2005). Exonerations in the United States 1989 through 2003. *The Journal of Law and Criminology*, 95, 1–32.
- Haney, C. (1993). Psychology and legal change: The impact of a decade. *Law and Human Behavior*, 17, 371–398.
- Haney, C., & Logan, D. (1994). Broken promise: The Supreme Court's response to social science research on capital punishment. *Journal Of Social Issues*, 50(2), 75–101. <http://dx.doi.org/10.1111/j.1540-4560.1994.tb02411.x>.
- Hedges, L. V. (1987). How hard is hard science, how soft is soft science? The empirical cumulativeness of research. *American Psychologist*, 42(5), 443–455. <http://dx.doi.org/10.1037/0003-066X.42.5.443>.
- Heilbrun, K., & Brooks, S. (2010). Forensic psychology and forensic science: A proposed agenda for the next decade. *Psychology, Public Policy, and Law*, 16, 219–253.
- Howard, G. S. (1993). When psychology looks like a ‘soft’ science, it's for good reason. *Journal Of Theoretical And Philosophical Psychology*, 13(1), 42–47. <http://dx.doi.org/10.1037/h0091107>.
- Innocence Project (2001). *Home page*. (Retrieved July 11, 2012, from <http://www.innocenceproject.org/>).
- Kovera, M. B., & McAuliff, B. D. (2000). The effects of peer review and evidence quality on judge evaluations of psychological science: Are judges effective gatekeepers? *Journal of Applied Psychology*, 85, 574–586. <http://dx.doi.org/10.1037/0021-9010.85.4.574>.
- Kreimer, S. (2005). Truth machines and consequences: The light and dark sides of “accuracy” in criminal justice. *New York University Annual Survey of American Law*, 60, 655–674.
- Kumho Tire Co., Ltd. v. Carmichael, 526 U.S. 137 (1999).
- La Fond, J., & Durham, M. (1992). *Back to the Asylum: The Future of Mental Health Law and Policy in the United States*. New York: Oxford University Press.
- Lehman, D. R., Lempert, R. O., & Nisbett, R. E. (1988). The effects of graduate training on reasoning: Formal discipline and thinking about everyday life events. *American Psychologist*, 43, 431–443.
- Maryland v. Craig, 110 S.Ct. 3157 (1990)
- McClure, D. (2007, June). Focus group on scientific and forensic evidence in the courtroom. Retrieved from <https://www.ncjrs.gov/pdffiles1/nij/grants/220692.pdf>
- McCroskey, J. C., & Young, T. J. (1981). Ethos and credibility: The construct and its measurement after three decades. *Central States Speech Journal*, 32, 24–34.
- Melton, G. B., Petrila, J., Poythress, N. G., & Slobogin, C. (2007). *Psychological evaluations for the courts: A handbook for mental health professionals and lawyers*. New York, NY: Guilford Press.
- Monahan, J., & Walker, L. (1998). *Social science in law: Cases and materials* (4th ed.). Westbury, NY: Foundation.
- National Research Council (2009). *Strengthening forensic science in the United States: A path forward*. (Washington, DC).
- Neal, T. M. S., & Brodsky, S. L. (2008). Look into my eyes: Expert witness credibility as a function of eye contact behavior and gender. *Criminal Justice & Behavior*, 35, 1515–1526.
- Perlin, M. (1991). Morality and pretextuality, psychiatry, and law: Of “ordinary common sense”, heuristic reasoning, and cognitive dissonance. *The Bulletin of the American Academy of Psychiatry and Law*, 19(2), 131–150.
- Perlin, M. (1993). Pretexts and mental disability law: The case of competency. *University of Miami Law Review*, 47, 625–688.
- Perlin, M. (2013). Sanism and the law. *Virtual Mentor*, 15(10), 878–885.
- Pronin, E., Lin, D. Y., & Ross, L. (2002). The bias blind spot: Perceptions of bias in self versus others. *Personality and Social Psychology Bulletin*, 28, 369–381.
- Redding, R. E., & Richard, E. (1998). How common-sense psychology can inform law and psychological research. *University of Chicago Law School Roundtable*, 5(1), 107–142.
- Redding, R., Floyd, M., & Hawk, G. (2001). What judges and lawyers think about testimony of mental health experts: A survey of the courts and bar. *Behavioral Sciences and the Law*, 19, 583–594. <http://dx.doi.org/10.1002/bsl.455>.

- Redding, R., & Murrie, D. (2007). Judicial decision making about forensic mental health evidence. In A. Goldstein (Ed.), *Forensic psychology: Emerging topics and expanding roles* (pp. 683–707). Hoboken, NJ: Wiley.
- Redding, R. E., & Reppucci, N. D. (1999). Effects of lawyers' socio-political attitudes on their judgments of social science in legal decision making. *Law and Human Behavior*, 23, 31–54.
- Risinger, D. (2000). Navigating expert reliability: Are criminal standards of certainty being left on the dock? *Albany Law Review*, 64(1), 105–108.
- Roesch, R., Golding, S. L., Hans, V. P., & Reppucci, N. D. (1991). Social science and the courts: The role of amicus curiae briefs. *Law and Human Behavior*, 15(1), 1–11.
- Rogers, R., Bagby, R. M., Crouch, M., & Cutler, B. (1990). Effects of ultimate opinions on juror perceptions of insanity. *International Journal of Law and Psychiatry*, 13, 225–232.
- Rozelle, S. (2007). Criminal defendants and the short end of the science stick. *Tulsa Law Review*, 43, 597–598.
- Saks, M. J. (1990). Expert witnesses, nonexpert witnesses, and nonwitness experts. *Law and Human Behavior*, 14, 291–313.
- Saltzburg, S., & Capra, D. (2000). *American criminal procedure* (6th ed.). Eagan, Minnesota: West Publishing Company.
- Shuman, D. W., Champagne, A., & Whitaker, E. (1996a). Assessing the believability of expert witnesses: Science in the jury box. *Jurimetrics Journal*, 37, 23–33.
- Shuman, D. W., Champagne, A., & Whitaker, E. (1996b). Juror assessments of the believability of expert witnesses: A literature review. *Jurimetrics Journal*, 36, 371–382.
- Shuman, D., & Greenberg, S. (2003). The expert witness, the adversary system, and the voice of reason: Reconciling impartiality and advocacy. *Professional Psychology: Research and Practice*, 34, 219–224. <http://dx.doi.org/10.1037/0735-7028.34.3.219>.
- Slovenko, R. (1987). The lawyer and the forensic expert: Boundaries of ethical practice. *Behavioral Sciences & the Law*, 5, 119–147.
- Slovenko, R. (1999). Testifying with confidence. *Journal of American Academy of Psychiatry and the Law*, 27, 127–131.
- Swenson, R. A., Nash, D. L., & Roos, D. C. (1984). Source credibility and perceived expertness of testimony in a simulated child-custody case. *Professional Psychology: Research and Practice*, 15(6), 891–898. <http://dx.doi.org/10.1037/0735-7028.15.6.891>.
- Tanford, J. A. (1990). The limits of scientific jurisprudence: The supreme court and psychology. *Indiana Law Journal*, 66, 151.
- Tremper, C. (1987). The high road to the bench: Presenting research findings in Appellate briefs. In G. B. Melton (Ed.), *Reforming the Law: Impact of Child Development Research* (pp. 199–231). New York: Guilford.
- Vidmar, N. (2005). Expert evidence, the adversary system, and the jury. *American Journal of Public Health*, 95, S137–S143.
- Welner, M., Mastellon, T., Stewart, J., Weinert, B., & Stratton, J. (2012). Peer-reviewed forensic consultation: Safeguarding expert testimony and protecting the uninformed court. *Journal of Forensic Psychology Practice*, 12(1), 1–34. <http://dx.doi.org/10.1080/15228932.2011.588526>.
- Wettstein, R. M. (2005). Quality and quality improvement in forensic mental health evaluations. *The Journal of the American Academy of Psychiatry and the Law*, 33, 158–175.
- Willinger, S. (1999). A trial lawyer's perspective on mental health professionals as expert witnesses. *Consulting Psychology Journal: Practice and Research*, 47(3), 141–149.